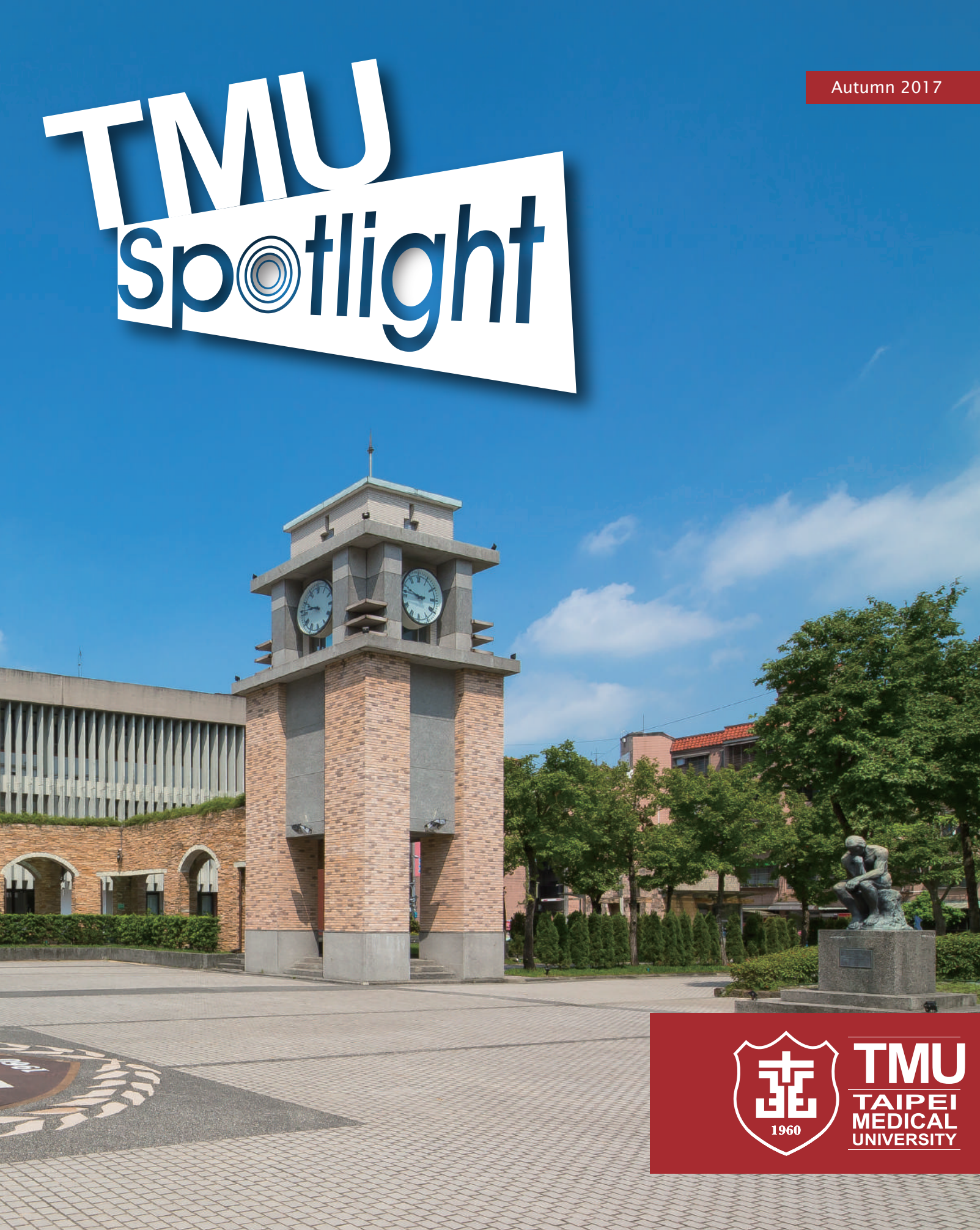
TMU Spotlight

Autumn 2017



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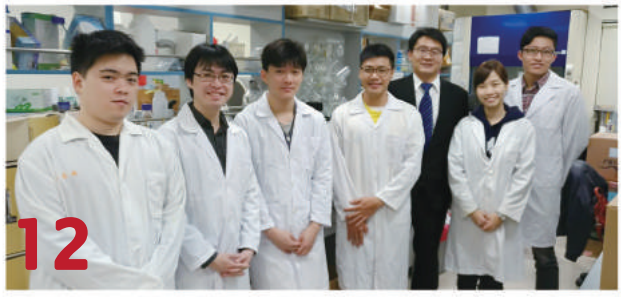

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TMU Spotlight

From solid roots to innovation's fruits

President Lin's inauguration opens a new chapter at Taipei Medical University

Two months into his term, Dr. Chien-Huang Lin, TMU's tenth and youngest president, shares his aspirations for his alma mater.

It was 1985 when I enrolled at Taipei Medical University as a pharmacy student. Thirty-two years ago TMU was fairly under-resourced, but we were always working hard to pursue our dreams, however ambitious they might seem.

Today TMU is an internationally renowned institution with a comprehensive education and research portfolio, cutting-edge health services, sound business development, and a proud history of 57 years. And we are still working just as hard, if not harder, to materialize our vision to become a top global university. All of this makes it an honor to serve as TMU's 10th president.

Since I assumed office on the first of August, I have been meeting with deans of colleges and leaders of offices and business functions to make sure that we keep delivering excellence in every aspect of our operations while approaching new ideas and opportunities with creativity – innovating from legacy, as I call it.

Standing on the shoulders of giants

Members of the TMU family before our time, in their collective efforts, have left us a wealth of legacy that is now the bedrock of our operations. As a medical university, we have been striving to introduce humanities to medical and health sciences education to equip our graduates with professional competences they will need to deliver health services in the future.

The TMU community also is increasingly globalized as we build international collaborations to strengthen our teaching and research. We employ information technology to facilitate our business management and decision-making, and this has considerably improved our efficiency.

Our strong commitment to fighting cancer is clear from the construction of the Taipei Cancer Center, which will channel research findings toward applications in clinical treatments serving patients around the world.

At the core of our operations is a tradition of innovation. The solid development we have in areas such as medical humanities, internationalization, IT-supported management practices and translational research will guide our next steps as we march into a world of future education that requires very different skills and mind-sets.

Looking ahead, I believe we should continue to focus on embedding innovation in education, research, industrial collaborations and the health care we provide. As a medical university, education will always be at the center of what we do. Our excellence in teaching and research has consistently been recognized by educational authorities, funding agencies and global university ranking assessments.

To maintain our success, our students in the

Under Wen-Chang Chang, Chairman of The Board, witness, President Chien-Huang Lin (right) receives TMU's official seal from former President Yun Yen (left). This symbalizes President Lin becomes TMU's 10th President.

near future will be able to take micro courses ranging from artificial intelligence and creative design to programming. These courses will build their capacity to operate in increasingly cross-disciplinary environments. I am glad to see that our students will be encouraged to play larger roles in their learning and to co-create their educational experiences.

Meanwhile we are leveraging the resources and networks that we have cultivated over the years with the public sector and business. TMU has established leadership in health care, biotechnology and healthy aging. Together with education, these complete the TMU biomedical platform "ecosystem."

By drawing strength from our heritage and innovations, this system will facilitate our long-term pursuit of applied research that impacts real-world problems. Our priorities in research development are translational cancer research, drug discovery, cell therapy, precision medicine and smart health care.

TMU's Shuang Ho campus will house our biotechnology cluster and support sustainable development of university-industry collaborations. In health care, we have plans to strengthen our efforts in neurology by creating a specialized neurology institute to integrate expertise for synergized research and treatment delivery. Our affiliated hospitals are extensively deploying new medical facilities and smart devices. They are also rapidly transforming their operations to better respond to health issues emerging from Taiwan's aging population – an area of shared concern which TMU, as a community member, should and can contribute to.

Engaging global partners, international talent and regional networks

Behind our growth strategy for TMU's comprehensive biomedical platform is a strong desire to engage with our global partners. We have developed partnerships with over 200 higher educational institutions and organizations around the world. And our student mobility programs average around 450 participants per year, which bespeaks a high level of international participation given the size of our student body.

Beyond the numbers and statistics, what is more important is that TMU has been turning partnerships on paper into substantial engagements. Building on our track record, we aim to expand our

student mobility portfolio by working with partner universities to offer wide-ranging transnational collaborative degree programs. Our strategic research partnerships with prestigious institutions in the USA and Japan will continue to thrive with jointly funded research projects and activities.

We also welcome established scholars and early-career researchers from all parts of the world to join TMU's exciting search for solutions to medical conditions and other health issues. Research teams relocating to TMU campuses are supported with space and facilities to further pursue their studies. We also attract increasing numbers of outstanding foreign academics through collaborative teaching and research projects with their home institutions.

While our collaborations with existing partners keep evolving, we also reach out to other institutions that share common interests with TMU to explore joint activities. In recent years we have witnessed an increasing appetite for educational opportunities in many different countries; we see growing numbers of students coming to TMU especially from ASEAN countries for our international programs. Our plans to initiate long-term collaborations with partners such as Vietnam, Indonesia, Thailand and India have won Ministry of Education support.

With this special funding, TMU is well positioned to work with our partners to promote ongoing professional development of health and medical professionals by providing opportunities for research and clinical training. TMU's commitment to nurturing local talent in the Southeast Asian region is strong, as we have every confidence in our strategic partnerships with local organizations. These partnerships will contribute to health system development in-country while also facilitating multilateral exchanges of people and ideas.

I believe that as an institution we benefit from having a diverse talent cohort that helps us to improve how we understand and approach different cultures and ways of thinking. Our international work will go from strength to strength, and it is encouraging to see so many members of the TMU family are ready to take part in this.

"INNOVATING FROM LEGACY"

Making TMU a happy organization

As a university we have indeed come a long way in the few decades from our humble beginning. Many alumni met at meetings and events share with me how rewarding they found their TMU journeys, as well as their satisfaction in seeing TMU's progress year after year. Now that we have decided on our path for the future, our steps will continue. But I am also aware how taxing it will be as we rise to these challenges.

It therefore remains an area of top priority for me to ensure that individuals in the organization feel secure and supported. To do that, we will make improvements to provide a better and more inclusive environment that encourages academic endeavour and the highest professional standards. Our training and development programs will allow individuals to explore their potential across functions and business streams to better prepare staff for career advancement.

As president of the university, I will strive to make TMU a happy organization that champions our achievements, values and pursuits. And I look forward to composing a new chapter of our proud history together with everyone in this family.

Global partners, IBM Watson help TMU researchers fight cancer

Superintendent Jacquelina Whang-Peng (middle) discusses with the conference attendees.

Turning scientific research findings into clinical treatments has long been a TMU specialty. Collaborations between scientists and clinicians seeking new strategies against cancer have been particularly fruitful.

Last spring's Joint Oncology Symposium, co-organized by the University of Pittsburgh Cancer Institute, brought US and Asian experts to TMU to share ideas on promising cancer treatments.

Lung, skin and prostate cancers were discussed using comparative studies of patient cohorts as well as care options. The UPCI-TMU Symposium also explored use of "big data" and data management applications for clinical treatment development.

Another example of TMU cancer research leadership is the Asia-Pacific Joint Symposium of Recent Progresses in GI Cancers held in last summer, which focused on gastric, colorectal and peritoneal carcinomatosis. Researchers from the National University of Singapore and the Chinese University of Hong Kong joined local peers to share new tools for early detection of gastric cancers, as well as recent chemotherapies that temper stromal response in pancreatic cancer.

"International research symposiums are useful platforms where we invite researchers from other countries to share their latest work," said TMU Taipei Cancer Center Superintendent Jacqueline Whang-Peng, a renowned researcher and Academia Sinica member who was the first woman scientist at the US National Institutes of Health. "I always encourage young and seasoned clinicians to take part in these events," because their discussions are "pre-selected, condensed, and relevant. … [Such interactions] are not replaceable by an online search" for physicians renewing their knowledge and skills.

Dr. Whang-Peng said existing cancer knowledge is insufficient, particularly in difficult clinical cases: "This is when the [doctors'] ability to conduct research becomes critical." She encourages clinicians to gain research skills, whether through programs like TMU's MD-PHD degree or postgraduate research. Yet for physicians who remain primarily clinicians, research meetings are crucial to professional development.

International or regional exchanges offer fresh perspectives, Dr. Whang-Peng said. "The similarities in dietary habits, lifestyles and external environments

in the Asia-Pacific region provide some preconditions for studies of locally prevalent cancers.

"Similarly, working with researchers in the United States helps [TMU researchers] understand how, given genetic differences and varied patient cohorts, the same cancers are treated with diverse approaches." Expanding physicians' knowledge base helps them choose the best treatments for each patient, she said.

IBM Watson brings best knowledge to bedside

TMU's tradition of evidence-based cancer treatment approaches led to the university's recent implementation of IBM Watson for Oncology, which helps inform oncologists' decisions aided by artificial intelligence technologies.

As Taiwan's Ministry of Health and Welfare expects more than 100,000 new cancer cases in 2017, service providers and systems seek data-driven, evidence-based cancer care. Yet the vast and rapidly expanding medical literature challenges busy clinicians who are also short of time to follow hundreds of journals. PubMed, a major US-govornment-funded archive service of biomedical and life sciences journal literature, shows that about 50,000 oncology research papers are published annually, and by 2020 medical information is projected to double every 73 days (Densen, 2011) , far outpacing human ability to keep up.

IBM Watson for Oncology identifies treatment options with supporting medical evidence for consideration by oncologists, drawing from more than 200 textbooks and 300 medical journals that represent nearly 15 million text pages. While oncologists may be able to access the same resources through traditional libraries, Watson's function is to filter and highlight evidence-based treatment options, ranking them and linking to peer-reviewed studies and clinical guidelines.

"The introduction of Watson for Oncology will be a game-changer for cancer patients in Taiwan," said Professor Yun Yen, a renowned oncologist and researcher who just stepped down as TMU's president. "With Watson, our team of oncologists can make informed treatment decisions for patients based on insights derived from the individuals' unique health status, the latest medical research and other relevant data."

Cancer patients will benefit from more comprehensive clinical judgements based on this computing tool. Taiwan's first health care system to implement this is Taipei Medical University's four affiliated hospitals – the Taipei Cancer Center, TMU Hospital, Wan Fang Medical Center, and Shuang Ho Hospital.

Densen, P., 2011. "Challenges and Opportunities Facing Medical Education." *Transactions in the American Clinical and Climatological Association*, 122: 48–58. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3116346/

TMU Spotlight

Genomics giant Nakamura redefines cancer

TMU chair professor classifies genetic changes so "we can attack at pinpoint" instead of targeting organ sites with identical treatments.

Prof. Yusuke Nakamura is Chair Professor in TMU's Clinical Pharmacogenomics and Pharmacoproteomics program, and visits the campus regularly for guest lectures and the Prof. Yusuke Nakamura Scholarship Award Ceremony. He also leads 13 researchers at his University of Chicago laboratory.

Imagine a world without breast or colon cancer, without bone or blood cancers.

For Prof. Yusuke Nakamura, that world has arrived – because the most promising treatments focus not on the tumor's location, but on the genetic changes that caused it.

This conceptual turnaround isn't an academic abstraction limited to researchers. The real payoff is for patients, who can receive personally targeted immunotherapy treatments that are much more effective. The former standard of care was to prescribe the same toxic chemotherapy drugs for every patient at a standard "maximum tolerated dose" that in practice is barely tolerable for patients – and that becomes less effective with each course of treatment.

Prof. Nakamura spoke with TMU Spotlight this summer, but he's used to the spotlight in terms of media coverage. He has for decades been a pioneer in cancer genomics, and his distinguished research career has yielded a thousand-plus publications as well as substantive advances in targeted treatments.

A few days before the interview, the Japan Times wrote an extensive profile on his early years as a cancer surgeon when despair spurred his passion for research, and on his reflections about different international research contexts.

And while he said he maintains his personal blog to keep his Japanese language skills sharp, his comments are even sharper. For example, a recent post concludes:

> *"It should be common sense to realize that doing immunotherapy after having weakened the patient's immune system through chemotherapy will result in problems. I mean, it should be common sense; but Japan appears to be immune to this common knowledge. If you want to call your standard treatments ethical, you need to pay extra attention to whether your patients are elderly, or not willing to undergo chemotherapy. Those patients suffering from declining liver, kidney, or heart function become refugees from the cancer system. What can we do about this petrified health system?" [translation by interviewer]*

Prof. Yusuke Nakamura (first line on the right side) with his laboratory team in University of Chicago

> TMU is very fortunate to partner with this eminent scientist thanks to a Taiwanese former student, Prof. Wei-Chiao Chang, who created the master's program at TMU after stints at Oxford University and RIKEN, the Japanese research powerhouse where the two worked together. (Prof. Chang is also profiled in this issue.)

Q: What is the next big news in cancer research? Are there sweeping advances in treatment or understanding just around the corner?

A: Now the classification of cancer is increasingly not by organ, as in breast cancer or lung cancer. That doesn't help anymore. Now the classification is done by the genetic changes. Actually multiple clinical trials based on genetic changes have started already.

Regardless of the organ, basically we screen for the mutations, and if a certain mutation is matched to a certain drug, then we can provide that drug to any patient [who has the mutation].

Less than one month ago, the US FDA [Food and Drug Administration] approved one drug for cancers that have a genetic instability. Regardless of organ, and whether adult or children: it's a new classification.

Pharmacogenomics is very important [in this conceptual shift]: because of it, we can view cancers according to their genetic changes. Now is the era of pharmacogenomics and pharmacogenetics, because we can select safer and more effective drugs by identifying these genetic changes. It's a very strong tool to provide benefits to patients with cancer and other diseases.

Most of conventional cancer drugs are toxic to cells, and high doses are required to kill cancer cells. But now we don't need the maximum dose for some newer drugs- we can attack cancer cells at pinpoint [scale].

Q: What are the comparative advantages of doing research in Taiwan as opposed to the US?

A: The good thing in Taiwan is you have a registry for the drug prescriptions [through the National Health Insurance claims system database]. Also you have a monitoring system for all kinds of adverse drug events.

And, for example, TMU has 3000 beds [in three hospitals], so lots of clinical materials are available there. So compared to Taiwan … for example, the University of Chicago Hospital has only 600 beds. Although we have affiliated hospitals, in general the hospital sizes in Taiwan are much bigger.

Q: How is Taiwan ready to be a leader in pharmacogenomics?

A: Because it has a homogeneous population. By comparison, the United States is very heterogeneous - we have quite different genetic backgrounds, particularly in Chicago, which seems to have a very diverse mix. To do pharmacogenomics, if populations are very diverse it's difficult to get something important [in terms of research results].

Also, I was very impressed by TMU's internationalization. For example, Dr. Chang's laboratory has quite heterogeneous populations: people from Malaysia, people from India, from some African countries.

This is very important- because I think young scientists should be exposed to other cultures and other countries. We need to learn from each other. We need to understand our heterogeneity and differences.

For example, I think Taiwan is the leading country for [research on] drug hypersensitivity, particularly skin rashes. The relation to the genomic factor for drug skin hypersensitivity was found in Taiwan. This is very important, because these reactions are often very lethal.

One type of skin hypersensitivity is called Stevens-Johnson syndrome – one third of such patients die. Taiwanese scientists found the connection between the drug and HLA, human leukocyte antigen.

And now they are using genetic tests to avoid drug hypersensitivity. [Taiwan is leading here] because of the registry of severe adverse reactions caused by drugs. That Taiwan has a registry – this is very important!

Here is an example of what we found. When breast cancer patients receive hormone therapy, one of the most commonly used drugs is tamoxifen, an estrogen receptor antagonist that works by blocking the estrogen pathway.

But tamoxifen itself has a very weak effect on the pathway. Our bodies add OH, oxygen and hydrogen, at the end – and then it becomes the very active [drug] form.

Twenty percent of Asians cannot convert tamoxifen to the active form, so for them it is useless and [leads to] higher incidence of recurrence. If we can pick up those kinds of patients, we can provide alternative drugs.

Q: Would you advise students to seek training in both clinical medicine and research, following your example?

A: I think it's better to be exposed to clinical medicine [as well as research methods] because then we can learn what the patients suffer from.

Medical science seeks to solve the problems patients have. We need to learn what the problems are, [and] what the patients want to do. For example, I worked as a surgeon and I operated on cancer patients.

There are many questions, but the simplest question is … why a normal cell is converted to a cancer cell. [Another question is why] the growth rates of cancer are quite different, individual by individual. Some cancer patients die very quickly, but some patients even at advanced stages can survive for two or three years. Some patients responded well to a drug, but some patients had no benefit and some suffered from severe adverse reactions that sometimes kill cancer patients.

So these are our natural questions, if we face the patient. To keep motivation high for many years, we should do science for others, we should do science for patients. From my experience, I believe so. My mother died of colon cancer too – this is my strong motivation to fight against cancer.

Q: Can you comment on Taiwan's progress toward globalization?

A: I think that already Taiwan is more international than Japan, because the majority of master's students [in the TMU program] came from outside of Taiwan; in Japan, [international students are] rather limited.

Of course, the United States is more international, but Taiwan's system is very well-adapted to internationalization. Education is done in English – it's excellent! A mixture of cultures is needed to stimulate young people. And [Taiwan students] are very nice, and very diligent.

Q: Could you comment on the US scientific research system?

A: Because I have a Japanese heritage, I feel there's too much freedom … because young scientists need to have some experience and a good education to learn science. But here, soon after having limited exposure and training in science, they can become independent.

Medicine is borderless. This is important: it doesn't matter whether a patient is in China, Taiwan or Japan. If we find something important, we can provide better treatment to all patients, regardless of countries.

Q: Do you have advice for young researchers?

A: I think students need to be exposed to high-level scientists. So I'm trying to teach them not only about science, but also how they should think about their future, how they should contribute to patients. This is my role: to encourage young people to move on.


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TMU spotlight

How TMU's pharmacogenomics program became Taiwan's research leader
An interview with Prof. Wei-Chiao Chang

With a bachelor's degree in pharmacy, a master's degree in pharmacology, and a secure and challenging job reviewing clinical trials for Taiwan's Food and Drug Administration, friends were amazed that Wei-Chiao Chang would choose a wandering life doing Ph.D. research abroad.

But at that TFDA desk fifteen years ago, he was struck by clinical trial results that showed some drugs performed better for Caucasian patients than for Asian patients. He was deeply curious about why the two populations responded so differently.

This question led him to propose doctoral research in this area. With financial support from Taiwan's government and a UK Overseas Research Student Award, he gave up his good job to move to Oxford, the English-speaking world's oldest university.

Prof. Anant Parekh was the young scholar's supervisor, and Prof. Chang describes him as a remarkable educator who inspired him to become a scientist. So when he graduated in 2007, his curiosity again led to a career move across the planet – this time inspired by Japan Biobank research.

Prof. Yusuke Nakamura's pioneering genomics studies used the clinical samples from the biobank he led as well as genome-wide association studies (GWAS) to examine genome-wide variants in individuals that were associated with traits. The Japan Millennium Project helped fund Prof. Nakamura's lab as it achieved global eminence in the new specialty. After the young Taiwanese scientist inquired by email and later was interviewed, he was invited to join the famous RIKEN institute that leads Japan's biomedical research.

Dr. Chang's research at RIKEN examined genetic variants affecting asthma and atopic dermatitis. While he said that a child's chance of developing these diseases is multifactorial, involving both genetics and environmental interactions, Dr. Chang sequenced 2500 clinical samples and came up with a winning hypothesis. One of the body's calcium channels called Orai1 that affects the immune system and inflammatory reactions indeed varied widely between populations, with helpful implications for clinical decisions.[1]

From overwork to work-life balance

After two years of fruitful research at RIKEN, Dr. Chang was at a crossroads. In Japan, the salary was better than in Taiwan, and RIKEN was the world's leading genomics research institute, but the working hours were very long. So when Prof. Hank Juo and the president of Kaohsiung Medical University recruited Dr. Chang, he set up his own lab.

No job is easy in the beginning, he recalled with a laugh, but the salary was much lower and he was still working just as hard as in Japan! Plus he commuted to Taipei each weekend for three years to see his wife, even when their son was born.

Fifty papers came out of those four years, making Prof. Chang one of the Kaohsiung school's leading scientists in terms of productivity. But when TMU's President Yun Yen recruited him in 2012 to set up a master's degree program for Clinical Pharma-

1 ORAI1 Genetic Polymorphisms Associated with the Susceptibility of Atopic Dermatitis in Japanese.

cogenomics and Pharmacoproteomics, he jumped at the chance to join his family, and started a new lab in the Pharmacy Department.

This lab that Prof. Chang started with just three technicians, two undergraduates and one Ph.D. student has more than tripled in workforce. Nearly 20 people work in the lab now, and sixty percent of his grant money goes straight to student workers. "I hope to improve the economic condition of every student, so that they can fully focus on their research without worrying about the cost of living in Taipei," he said.

Prof. Wei-Chiao Chang

While in the past his students found the lab's working hours extremely long, now Prof. Chang encourages work-life balance. His lab meetings are on Tuesday evenings so clinicians can attend. And he always serves a nice meal then "because students never have much money."

"I never say no when someone requests time off," he said. "Life is not science – it can't be measured by a very few variables. Life is an art. It should be played and enjoyed with love."

How drugs and genes affect health

So Prof. Chang became the father of pharmacogenomics at TMU, and established Taiwan's leading lab in this fast-growing area of study. He explained: "'Pharmaco' represents pharmacology, which is the study of how drugs affect the body, while genomics is the study of genetic variants between individuals and populations." Thus there is no perfect medicine, he said, precisely because people respond differently to the same drug.

Because efficacy varies, people require different dosages. And some drugs that help most people can cause dangerous adverse drug reactions in others. His lab cooperates with many physicians to collect clinical samples. Then DNA is extracted from blood, and these samples are sequenced and analyzed using a bioinformatics approach to address clinical questions.

For example, while intravenous immunoglobulin (IVIG) is the main treatment for Kawasaki disease, some patients have persistent fever after this treatment. These patients are defined as IVIG resistant.

With help from Dr. Ho-Chang Kuo's Kawasaki disease center at Kaohsiung Chang Gung Memorial Hospital, Prof. Chang and one of his doctoral students performed a genome-wide study and calculated weighted genetic risk scores.

This led them to establish a predictive model integrating the additive effects of all 11 single-nucleotide polymorphisms to better predict responses to IVIG. Their study was accepted for publication in Circulation Genetics earlier this year.

New frontiers: T cells and dynamic monitoring

Now Prof. Chang's lab is focusing on sequencing T-cell receptors to define human immunity, and he's working with TMU colleague Dr. Shiuh-Bin Fang to identify genes resistant to salmonella using Taiwan DNA samples.

Asked what new milestones lie ahead for his lab, Prof. Chang said, "Single-cell sequencing for immune repertoire." He explained that T cells respond to many things, but this diverse response is the safest and healthiest condition – for when immunity is narrowly targeted, it is like sending an army in one direction while leaving other sides unguarded.

Prof. Chang said he and Prof. Mai-Szu Wu, superintendent of Shuang Ho Hospital, just published a paper addressing potential correlation between the immune repertoire and erythropoietin response in end-stage renal disease patients.

"We started to establish immune sequencing four years ago [in 2013]; probably we were the first team in Taiwan to do this," he said. "Now we know how difficult this is. But it is very useful – especially dynamic monitoring for cancer treatments, especially for immune therapy."

Marching to a different drummer

Prof. Chang won TMU's award for best teacher this year; his lectures are very popular as well. His lab crew includes Thai, Malaysian, Indian and Malawian students, so clearly language barriers do not slow down the bench work.

TMU's pharmacy YouTube channel Pharmixperience has posted an interview he gave to students. He said, "They wanted to know why I didn't just stay with the TFDA or work as a pharmacist in the hospital, because it's a good and secure job," like the jobs the students have been told to aspire to.

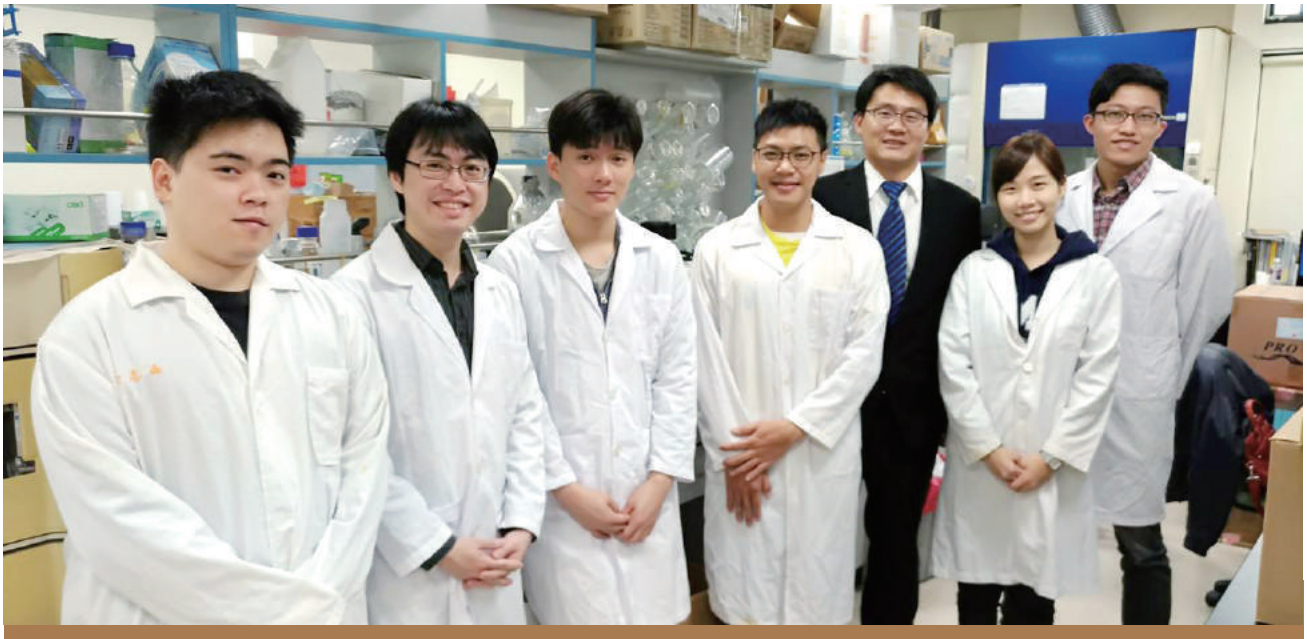
The answer is temperament. Prof. Chang's mentor had advised him that his personality needed the challenges of research, not the security of dispensing medications or working for government.

He said another plus of the scientist's life is what many academics dread: publishing. "I like writing," he said. Besides many scholarly papers, he has written two books and maintains a blog on Facebook.

Prof. Chang loved his time in England enough to share his photos in a book to convince Chinese-speaking students to study at Oxford. (His perfectionism meant waiting for only the rare sunny days, or waiting for hours for a vista to be free of cars so he could take the best possible photos.)

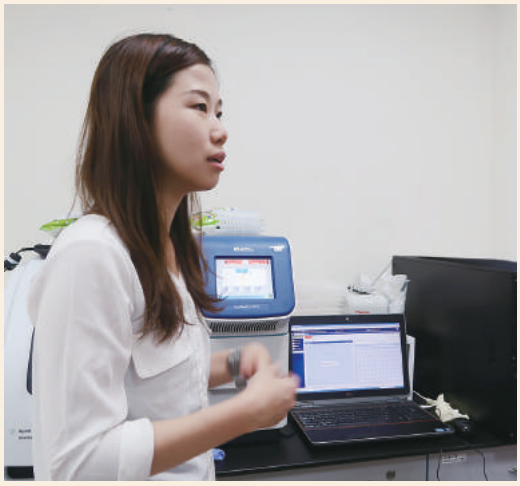
This book doesn't just help students: he donated its proceeds to Taiwan's Make A Wish Foundation. This charity gives children with cancer unusual opportunities and experiences, like travel and meeting their heroes.

"These children have so little time, and we have so much," he said. "We have to process a lot of material into just one drop of useful product in the lab. For these children, we are the catalytic agents: We should turn their many tears into smiles – at least once."



Prof. Wei-Chiao Chang (third from right) with his laboratory students

Romancing RIKEN for research links



It's not easy to establish continuing collaborations with Japan's largest comprehensive research institution. Founded a century ago in 1917 as a foundation, RIKEN has grown in size and scope to become a network of world-class research centers and institutes.

Prof. Wei-Chiao Chang, director of TMU's master's degree program for Clinical Pharmacogenomics and pharmacoproteomics, explained how he pushed and pushed to become one of RIKEN's partner labs, but for years received only polite rejections.

Finally a superstar resear- cher, Prof. Shiro Ikegawa, clued him in that the secret is to establish lab-to-lab links. Prof. Chang said that a project between Taiwan's Ministry of Science and Technology and RIKEN presented a good opportunity to start this formal collaboration, although the funding competition was tough.

Now, thanks to Prof. Chang's efforts, his team successfully obtained NT1.3 million in MOST funding to support Ph.D. students working at RIKEN for one year. (And since Prof. Chang has been in their shoes as a RIKAN researcher on a spartan Taiwan grant in that expensive country, he successfully lobbied RIKEN to add more financial support for these students as well, "so they can have a better time in Japan.")

International program associates (IPAs) are the key to this strong collaboration between TMU and RIKEN. With the support of Prof. Ikegawa, former TMU President Yun Yen, and Dean Pei-Shan Tsai of TMU's Office of Global Engagement, the agreement between TMU and RIKEN was confirmed in April, making TMU Taiwan's first private university to send such associates to Japan.

At that time, Ms. Hsing-Fang Lu, a Ph.D. student in Prof. Chang's lab, submitted her research proposal to RIKEN. Competing with other graduate students from around the globe, Ms. Lu was selected to join the IPA program.

She will go to RIKEN's Yokohama campus this October to spend a year analyzing genome-wide associative study data - as she did with 7500 samples in her impressive TMU research that secured the prestigious placement.

"Associative analysis is not enough anymore," she said. Besides combining this with eQTL and epigenetic profiles, her research will further use functional assays in cell lines or animal models to find causal links as well.

Ms. Lu also praised her working experience in the pharmacy of TMU's affiliated Shuang Ho Hospital. She said she appreciated Pharmacy Director You-Mei Lin for encouraging young pharmacists to work at different jobs there besides dispensing medications.

But like her mentor Prof. Chang, Ms. Lu has changed her career path to pursue a scientific career, not a dispensing or pharmaceutical sales job, after she completes her Ph.D. studies.

"TMU surprised me by having these kinds of international connections and opportunities," she said. "I would never have this wonderful chance without Prof. Chang's support. He is a great mentor." And she said her family supports.

TMU Spotlight

The Center for Education in Medical Simulation of TMU

SAFER, FASTER, BETTER

Why simulation is changing education?

US partnership helps Center for Education in Medical Simulation make headlines

Mayor, international evaluators applaud new facilities based on wiser guidance.

What's even better than the real thing? When it comes to health professionals' high-stakes decisions, simulations indeed deserve their prime place in TMU's educational landscape. Do you want a first-time pilot, or one who has managed crises in a flight simulator until their responses are correct and immediate?

Similarly, even the most promising surgical procedures involve a learning curve, with one TMU back surgeon estimating that it takes more than 20 operations to gain reliable skill using new techniques in minimally invasive surgery. Do you want to be one of those 20 patients?

The Center for Education in Medical Simulation is growing to meet these needs at TMU. This center has grown from its CEO's observations that a lot of training mannequins went unused and that nurses shunned emergency room jobs. Now CEMS has extended its technological and institutional reach even beyond our university – to help the city plan disaster response strategies for the recent Taipei Universiade, and to help learners worldwide with online courses.

Center CEO and Thomas Che-Wei Lin, a physician by training, said TMU's simulation center is the first Asian center to qualify in two certification categories of the Society for Simulation in Healthcare.

The center applies virtual technology to learning situations using high-end equipment. These technologies include a XVR (eXtreme Virtual Reality) 3D simulation system, the CEMS operating room's virtual

surgical system developed in cooperation with mobile phone maker HTC, a six-dimensional virtual reality imaging system and virtual patients.

TMU clinical education faculty can enhance their instruction by moving from physical models to virtual reality, allowing students to learn how to operate even the most advanced medical technologies well before they progress to patient care. The 727-sq. meter center also has a simulated intensive care unit that opens a new era of virtual-reality teaching.

An opening ceremony took place in May at the CEMS offices in TMU's Daan campus. Taipei Mayor Wen-Je Ko attended and was briefed on a disaster response system. The mayor, a physician by training, also witnessed simulation training for extracorporeal membrane oxygenation and viewed other medical simulation equipment.

In August, TMU hosted an annual Asian conference on simulation education featuring several US experts. It was organized by CEMS senior advisor Dr. Paul Phrampus, also director of the Peter M. Winter Institute for Simulation, Education and Research (WISER) at the University of Pittsburgh. Dr. Phrampus's advice has been central to the TMU center's development since Dr. Lin attended such an event in Hong Kong years ago.

As the conferees gathered nearby in the new Daan Campus's meeting hall, Dr. Phrampus and Dr. Lin spoke about CEMS' development and future milestones.

Q: Most people understand flight simulators limit risks that inexperienced pilots might pose to passengers and equipment. But they don't understand simulation in health services. Can you explain why this can be more important than face time?

Dr. Phrampus: The complexity of health care education is increasing at an astronomical rate -- and that's just the facts and figures of what one needs to know to be a practicing nurse or doctor. And then also [they need] the skills.

As you know, medical science is exploding with new discoveries and so on. So the first piece that I think simulation fits in a big way is transitioning from

Dr. Paul Phrampus

lecture, lecture, lecture – and people falling asleep in the lecture hall – to actually engaging them in their future profession in a simulated environment where they're free to explore; they're free to make mistakes. And because no can harm comes to a simulated patient, we think that with immersive education and simulation we can accelerate the learning curves. So if it makes their education more efficient…

Q: Didn't a recent paper based on research at the center find that students learned laparoscopic suturing faster and remembered better when the classroom was 'flipped' in a simulation setting than with traditional instructional methods[1]?

Dr. Phrampus: TMU is way ahead of the curve, because Thomas has been a real pioneer here in pushing things forward in the medical school. … He also branched out into the hospital and partnered with nurses and nursing education units.

This has been going on for many years here, and so that puts TMU ahead of the curve particularly when it comes to using simulation directly for patient safety. Simulation is not just for students, but for practicing professionals.

So here is a good place for simulation: education of practicing nurses, practicing physicians, practicing

1 "The Effectiveness of a Simulation-Based Flipped Classroom in the Acquisition of Laparoscopic Suturing Skills in Medical Students," *Journal of Surgical Education*, July 19, 2017

Director Thomas Che-Wei Lin

pharmacists – people who touch patients and have the possibility of making a mistake.

Centers like Thomas leads here make that transition easier to the "second world" of simulation [after student training]: the patient safety and practicing professionals.

Dr. Lin: [Simulation] is high-engagement education, so it must be a small group. We're improving simulation instructional methods [in partnership with] the University of Pittsburgh and the Gordon Center for Research in Medical Education at the University of Miami.

Dr. Phrampus: One another advantage that Thomas brought to TMU is he turned this center in the last 5 or 6 years into a beacon of leadership for faculty development. The dirty little secret in health-care education is that none of us are really educators; we're all just doctors and nurses and pharmacists and respiratory therapists – but some of us get assigned to teach. (laughter) What we need to do is fuse education for principles and education for skills. For normal clinical folks, we can get them up to a level of competency to come in the simulation lab and be very effective. He [Thomas] adopted that model quite a while ago; that's why he's got so many instructors, that's why they run so many programs at his center.

Dr. Lin: You have to attend our training faculty training course; we have several courses. They can teach in pairs, then individually; they can design a course. … [Simulation offers] ways of teaching the same stuff faster. [As faculty grow] familiar with the message of simulation education, we can help each specialty.

The dental school [has had] the best simulation program … We hold their hand and say 'Let's convert your good idea in dentistry into an immersive learning process.'

In the end, step by step, we nurture ideas, and we get them [faculty] to focus on efficiency and effectiveness in the ultimate outcome.

Dr. Phrampus: We don't want to get sidetracked by simulation; people can get enamored with the theatrics and get confused and think that that's the part that's effective. So the job of a well-trained faculty development center is to help people navigate those potential risks of getting hooked on the technology and keep them on message, focusing on the needs.

Q: What inspired you? Can you share your path to leadership in this field?

Dr. Lin: My first experience to teach using simulation? I'm an emergency physician, so we focus a lot on resuscitation. Maybe 8 years ago I was the ACLS[2] instructor; at that time I thought I knew simulation very well!

They used a mannequin in the past, so I thought, 'If you use a mannequin, you're teaching with simulation.' But besides mannequins I found many more things! So I listened to Paul's speech, then took his course in Hong Kong to gain a more comprehensive idea.

I applied [simulation] in my daily work, and then one day the vice president asked [me to]expand this [simulation] at Taipei Medical University Hospital. Hospital accreditation focuses on patient safety issues, so we developed courses that also focus on some patient safety issues.

One day [former TMU President Yun Yen] asked if I can design a similar simulation education [program for TMU], so we standardized patient training [and expanded this]. Also, once we established our center

2 Advanced cardiovascular life support (ACLS) comprises clinical interventions for urgent treatment of cardiac arrest, stroke and other medical emergencies.

we needed someone to guide us, so we invited Paul as our senior advisor.

For years [the center was located] in a small basement space, but Paul said not to worry about that: 'The fundamental job is to make a logical structure. If you have the faculty, you don't need a castle.'

Q: Where do you see Taiwan having strengths? Where can we add to medical simulation?

Dr. Phrampus: I think that Thomas is already starting that leadership process by adopting a framework to become a center of excellence in faculty development for medical education. But he also went through the enormous task of getting his center accredited by the Society for Simulation in Health Care.

The other thing I think is really exciting is [that] in general the medical and nursing communities are a little bit closer in terms of the way they interact. My interactions have been at the Taiwan Society for Emergency Medicine and so on; having that ability to put together a small network is relatively easy [in Taiwan], and I think is a big strength.

In terms of faculty development he's not only done great work here in Taiwan, but he's also recruited lots of people as well put on conferences like this one and others.

The other thing that I think is extraordinary about TMU and the hospital system is the support they've given to him. [Dr. Lin] modeled it after my center -- and I'm not saying my center's the basic model, but we're in a similar situation where we are partnered directly with the University of Pittsburgh and the UPMC health system.

So that's why we cross that mission back and forth between students and practicing professionals. [People need to] hear the patient safety side of it: how does this apply to work inside real hospitals where real people are caring for patients? Because most people know about medical simulation for students but not practitioners, that's I think a very unique theme of CEMS.

And he's gotten tremendous support... Without leadership support this stuff goes nowhere. What has brought this center to become such a roaring success: the leadership pays attention to making sure there's a sustainable program in place.

Q: What can you foresee as future developments in simulation and for CEMS?

Dr. Lin: We've been working hard on online courses about simulation-based medical education. ... Materials and everything are ready, but we will try to look for some grants to help; then we can do it maybe next year.

CEMS helps city simulate disaster planning to protect 2017 Universiade

The Center for Education in Medical Simulation (CEMS) of Taipei Medical University has introduced an XVR (eXtreme Virtual Reality) Disaster Response Platform to simulate disasters at the Universiade sports events in cooperation with Taipei's fire department. Using 3D real-time simulation to conduct rescue exercises, the platform helps the medical system keep pace with fire and rescue efforts for maximum efficiency.

CEO Dr Che-Wei Lin said the XVR Disaster Response Platform simulates crisis response and disaster prevention exercises to minimize casualties. TMU is cooperating with Taipei fire officials to design three to five Universiade lesson plans for handling terrorist attacks, fires, explosions, crowd stampedes and other incidents. The platform can simulate fire and rescue team dispatching over time to optimize processes when disasters occur.

In the past, actual drills using traditional exercises were conducted according to prewritten scripts. In contrast, an XVR exercise does not pre-suppose any disaster situation in advance; instead this is dictated by the computer simulation. Fire officials respond with specific instructions, such as the numbers of fire engines to dispatch and the locations where ambulances can reach casualties most quickly.

The Universiade project marks the beginning of longer-term cooperation with Taipei's firefighting officials, because this high-tech training will be used for future disaster drills. CEMS also is developing online medical simulation courses with partners at Eastern Virginia University. In addition, the center helps Southeast Asian countries develop medical simulation education by providing training in Taiwan.

TMU's Center for Education in Medical Simulation passes SSH evaluation

Asia's first dually certified center noted for assessment and teaching

During the past six years, only 54 medical simulation institutions around the world have passed Society for Simulation in Healthcare (SSH) evaluations. TMU's Center for Education in Medical Simulation in December 2016 became Asia's first training center to qualify in both assessment and teaching/education categories.

As the world's largest medical simulation education society, SSH promotes medical simulation education, assessment, and research. SSH has offered global simulation education training evaluation and certification since 2010 to improve simulation education.

TMU has committed to developing medical simulation education to improve patient safety. In 2016, TMU applied for two SSH evaluations to examine assessment and teaching quality. In addition to a documentary review, the international evaluation committee conducted a site visit in October 2016. TMU passed the evaluations and a report showed the center has met SSH standards. The International Meeting on Simulation in Healthcare (IMSH 2017) awarded the evaluation certificates to TMU in January 2017 in Orlando, Florida.

Through the evaluation, TMU's Center for Education in Medical Simulation reviewed its educational and administrative processes comprehensively, improving simulation education quality to meet international criteria. This SSH evaluation also indicates the high priority TMU places enhancement on patient safety and on delivering the highest quality of care using global standards and impartial reviewers.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